The Advancement of Traumatic Brain Injury (TBI) Care During Modern Warfare

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Disclaimer

The views expressed in this presentation are those of the author and do not reflect the official policy of the Department of the Army, DoD, or U.S. Government.

OVERVIEW

- TBI Fundamentals, Features, Mechanisms
- TBI in the Era of OIF/OEF
- TBI Symptoms, Co-morbidities and Recovery
- mTBI Screening Challenges

Defense and Veterans Brain Injury Center (DVBIC)

Primary Operational TBI Component of the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury

TBI Fundamentals, Features & Mechanisms

What isTBI?

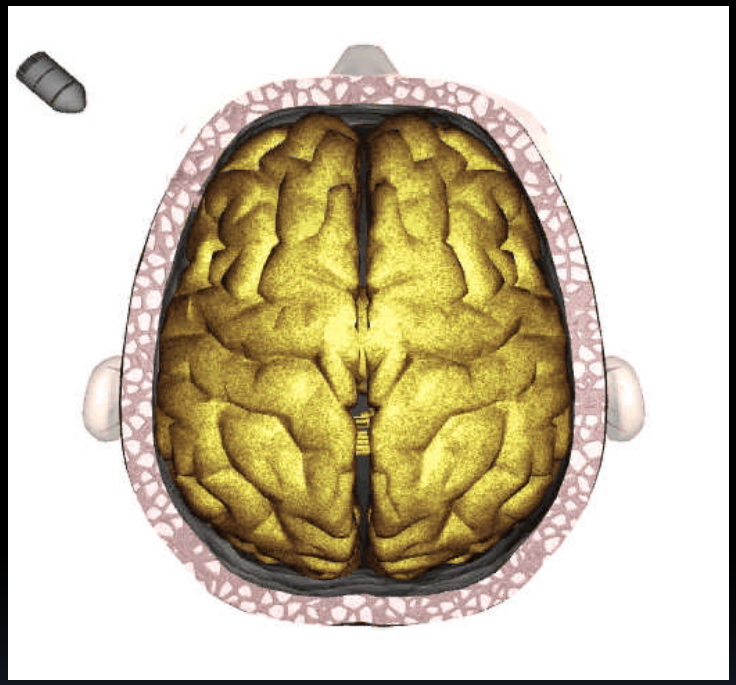
- A blow or jolt to the head or a penetrating head injury that disrupts the function of the brain. Not all blows or jolts to the head result in TBI.

Traumatic Brain Injury (TBI)

- TBI can be penetrating or closed.
- Each can cause lasting consequences.
- Penetrating injuries are typically identified and cared for immediately.
- Closed TBI may be missed when more visible injuries require immediate attention.

Closed Traumatic Brain Injury

Penetrating Brain Injury



- GSWs, Stabbing, Fragment
- Typically easily identified at the scene
- Neurosurgical intervention

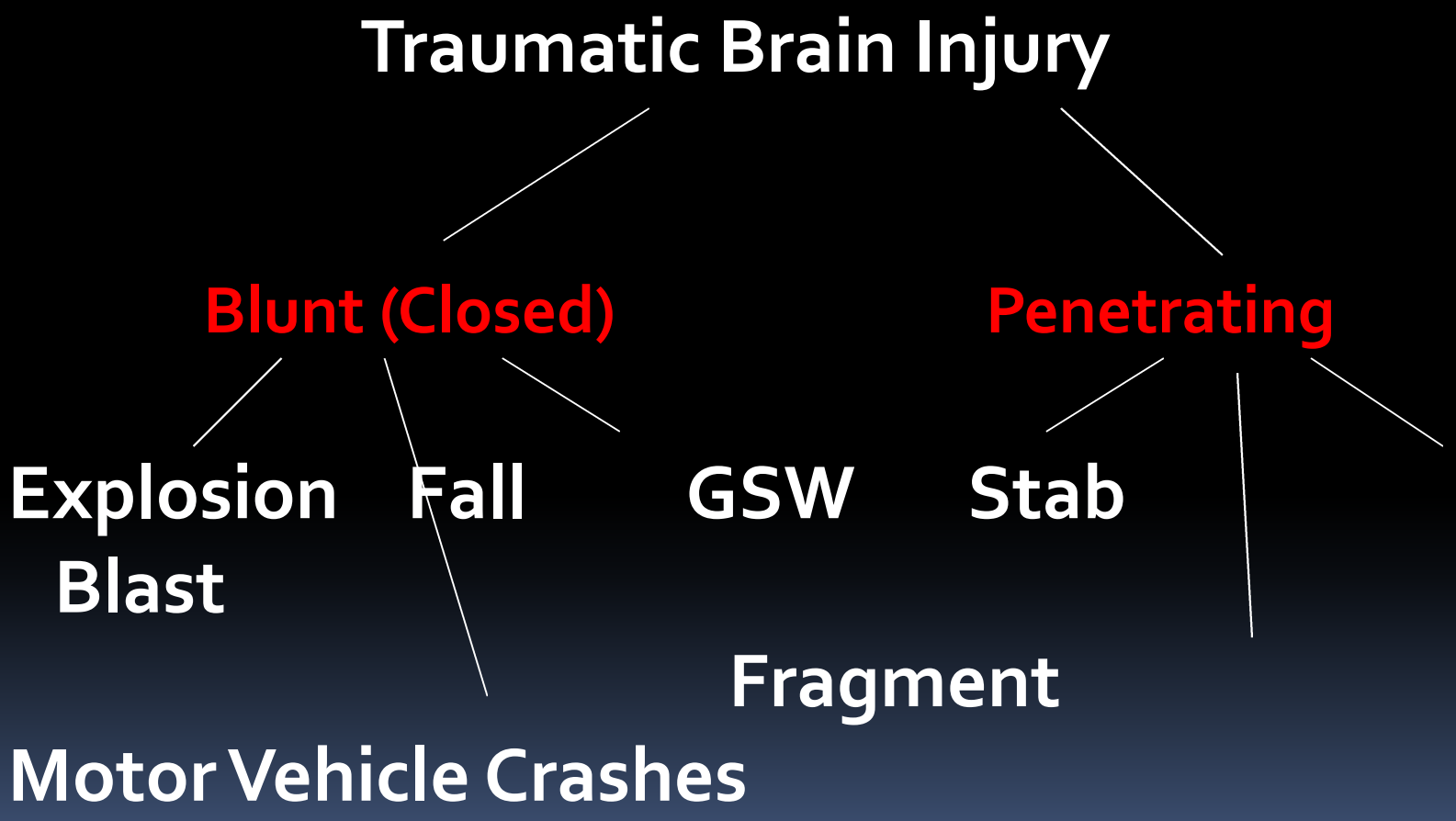
Heather Brammer X-ray

(*Not* penetrating)

Bullet lodged in the thickest part of Heather Brammer's skull

Image courtesy of msnbc.com

Mechanisms of Injury



TBI Statistics

- DVBIC data 2003 through March 31, 2010
  - DVBIC sites treated 13,749 TBI patients
  - **Over 90%** of combat-related TBIs are closed head injuries
    - Most are concussion / mTBI
  - Over half of reported injuries are blast related

DoD Definition of Traumatic Brain Injury (TBI)

- A disruption of brain function resulting from a blow or jolt to the head or a penetrating head injury

Indicated by new onset or worsening of at least one of the following:
Loss of consciousness (LOC)
Post-traumatic amnesia (PTA) • Loss of memory immediately before or after injury
Alteration of consciousness (AOC) • Change in mental status at the time of injury • Confused, disoriented, slow thinking
Neurological deficits that may or may not be temporary • Weakness, loss of balance, change in vision, weakness, paralysis etc.
Intracranial lesion

OSD/HA MEMO OCT 1, 2007

Criteria for Diagnosing a Concussion

- **Two conditions** must be met before a concussion can be diagnosed:
  1. An injury has occurred
  2. Alteration of consciousness resulting from the injury *(Note: Loss of consciousness is NOT required)*

Severity	GCS	AOC	LOC	PTA	Imaging
Mild	13-15	≤ 24 hrs	0-30 min	≤ 24 hrs	Normal

GCS = Glasgow Coma Scale*
LOC = Loss of Consciousness
AOC = Alteration of Consciousness
PTA = Post-traumatic Amnesia

*GCS is not a part of the official DoD definition. However, it is often used in clinical practice.

Severity Rating for TBI

Severity	GCS	AOC	LOC	PTA
Mild	13 - 15	≤ 24 hrs	0 - 30 min	≤ 24 hrs
Moderate	9 - 12	> 24 hrs	> 30min < 24 hrs	> 24hrs < 7 days
Severe	3 - 8	> 24hrs	≥ 24 hrs	≥ 7 days

GCS- Glasgow Coma Score

AOC- Alteration in consciousness

LOC -Loss of consciousness

PTA- Post-traumatic amnesia

- Consider Imaging results when determining level of severity
- Positive Imaging = at least a moderate TBI rating
- GCS not as useful given complications of theater setting
- Use of AOC in DoD severity rating

TBI Screening

Concussion (mTBI) Definition

Two conditions must be met to suspect / diagnose a TBI:

- A traumatic injury mechanism / event must occur (Blast, GSW above the neck, Fall, MVA, etc.)
- The person must have experienced an alteration of consciousness (ranging from dazed or confused to amnesia to loss of consciousness)
  - **More difficult to determine when injury occurs in combat setting**
  - **The patient interview is key to making the correct diagnosis**

tbl1

Directive Type Memorandum 09-033 was Signed 21 June 2010

- Need for a Policy Update
  - Early detection, leading to appropriate treatment, is the cornerstone for successful recovery from mTBI
  - TBI continues to be a major concern of the military on many fronts
- Policy Changes
  - The policy identifies an incident based protocol that calls for mandatory screening and rest periods for any service member exposed to a listed event
  - Line Role
    - It states that responsibility for force preservation lies with the leaders and the service members themselves
  - Medical Role
    - Updated the clinical practice guidelines for the management of concussion in the deployed setting

Slide 18

tbl1 This slides was just added in to speak to what the DTM acutally is.
tlattimore, 8/26/2010

Highlights from the DTM

- **Event driven protocols:** Exposure to potentially concussive events require mandatory medical evaluation and **24-hour rest** period (downtime)
- All sports and activities with risk of concussion are prohibited until **medically cleared**
- Military Acute Concussion Evaluation (MACE) documentation includes **3-part score**
- Service Members diagnosed with mTBI will be given a **standardized educational sheet**
- New protocols for anyone sustaining **multiple** concussions within 12 months
- Shared responsibilities between **medical** and **line**

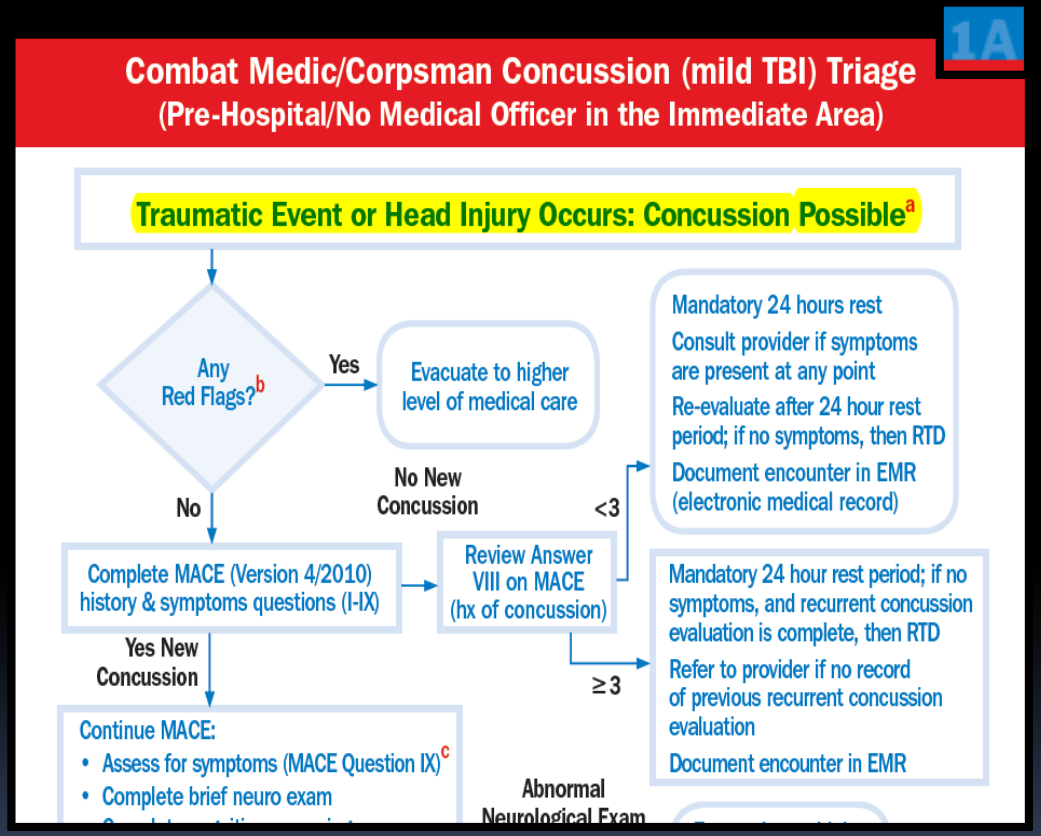
Mandatory Events Requiring Evaluation

- Any Service Member in a vehicle associated with a blast event, collision or rollover
- All within 50 meters of a blast (inside or outside)
- Anyone who sustains a direct blow to the head
- Command directed, including (but not limited to) repeated exposures to blasts

When to Screen for Concussion

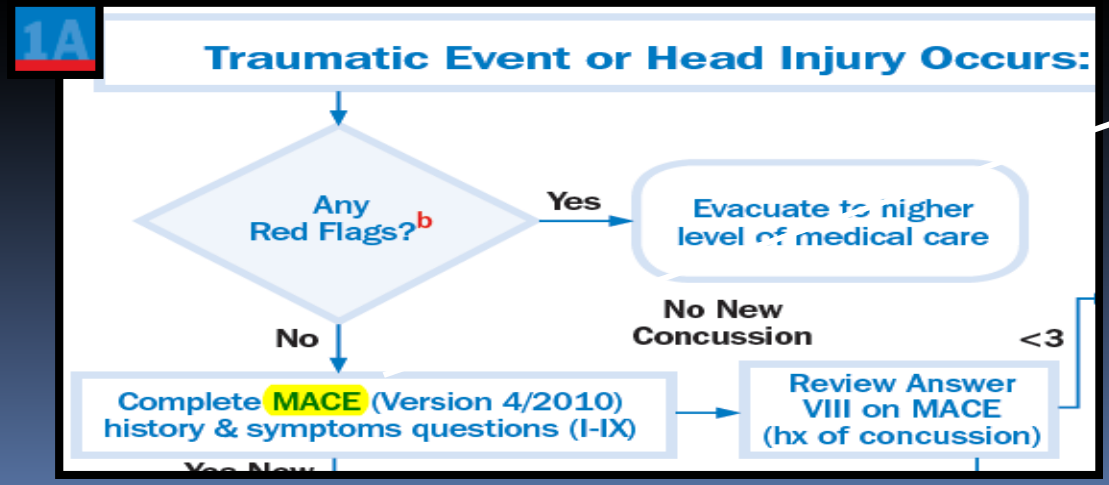
"Concussion Possible" with anyone who has:

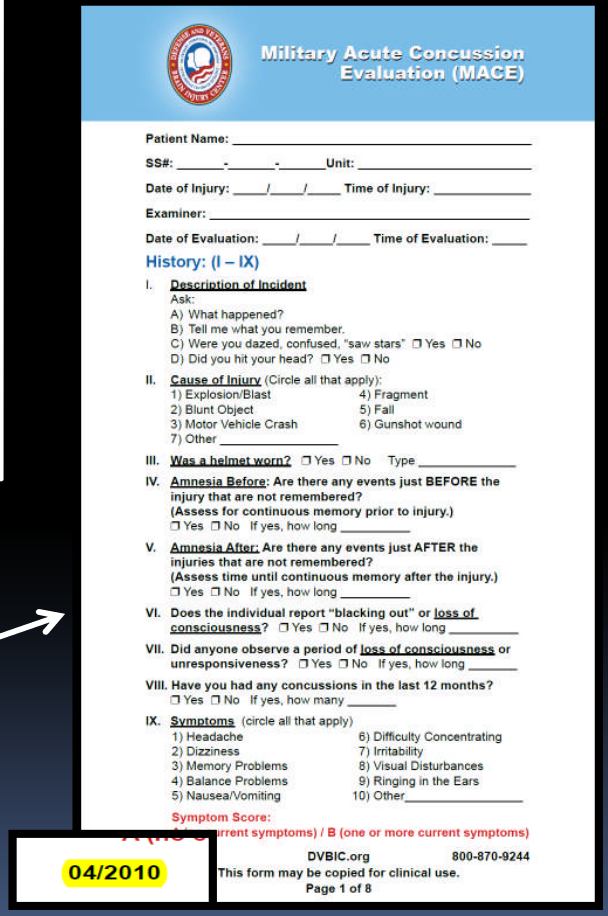
- Alteration of **consciousness**
- Dazed, confused, saw "stars"
- Lost consciousness
  - Even momentarily
- Has memory loss resulting from:
  - Explosion
  - Blast
  - Fall
  - Motor vehicle crash
  - A direct blow to the head or other head injury
- With an exposure to a mandatory screening event



Using the MACE to Screen for Concussion

- Carefully establish if there was an unwitnessed LOC or AOC immediately after the injury event:
  - Having their bell rung (AOC)
  - Temporary confusion (AOC)
  - Temporarily blacked out (LOC)
- **If <u>AOC/LOC did not occur</u>, the MACE is stopped at the bottom of the first page (symptom & history section)**
  - Document symptoms in the medical record
  - Continue evaluation (not MACE) to determine other causes of these symptoms





Military Acute Concussion Evaluation (MACE)

Patient Name: _____

SS#: ___-___-____ Unit: _____

Date of Injury: ____/____/____ Time of Injury: _____

Examiner: _____

Date of Evaluation: ____/____/____ Time of Evaluation: ____

History: (I – IX)

I. Description of Incident
Ask:
A) What happened?
B) Tell me what you remember.
C) Were you dazed, confused, "saw stars" ❒ Yes ❒ No
D) Did you hit your head? ❒ Yes ❒ No

II. Cause of Injury (Circle all that apply):
1) Explosion/Blast 4) Fragment
2) Blunt Object 5) Fall
3) Motor Vehicle Crash 6) Gunshot wound
7) Other _____

III. Was a helmet worn? ❒ Yes ❒ No Type _____

IV. Amnesia Before: Are there any events just BEFORE the injury that are not remembered?
(Assess for continuous memory prior to injury.)
❒ Yes ❒ No If yes, how long _____

V. Amnesia After: Are there any events just AFTER the injuries that are not remembered?
(Assess time until continuous memory after the injury.)
❒ Yes ❒ No If yes, how long _____

VI. Does the individual report "blacking out" or loss of consciousness? ❒ Yes ❒ No If yes, how long _____

VII. Did anyone observe a period of loss of consciousness or unresponsiveness? ❒ Yes ❒ No If yes, how long _____

VIII. Have you had any concussions in the last 12 months?
❒ Yes ❒ No If yes, how many _____

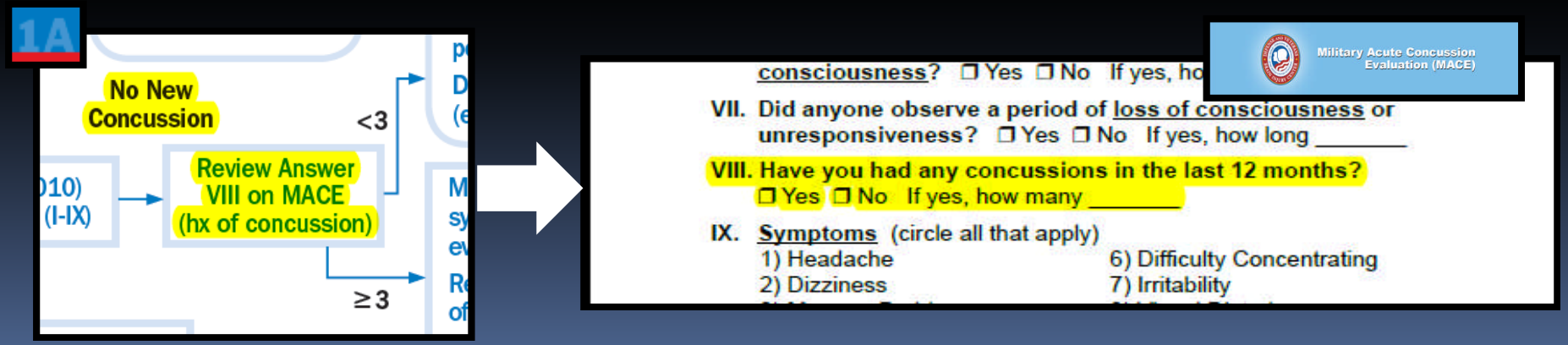
IX. Symptoms (circle all that apply)
1) Headache 6) Difficulty Concentrating
2) Dizziness 7) Irritability
3) Memory Problems 8) Visual Disturbances
4) Balance Problems 9) Ringing in the Ears
5) Nausea/Vomiting 10) Other_____

Symptom Score:
A (no current symptoms) / B (one or more current symptoms)

04/2010 DVBIC.org 800-870-9244
This form may be copied for clinical use.
Page 1 of 8

Screening for Concussions in the Past 12 Months

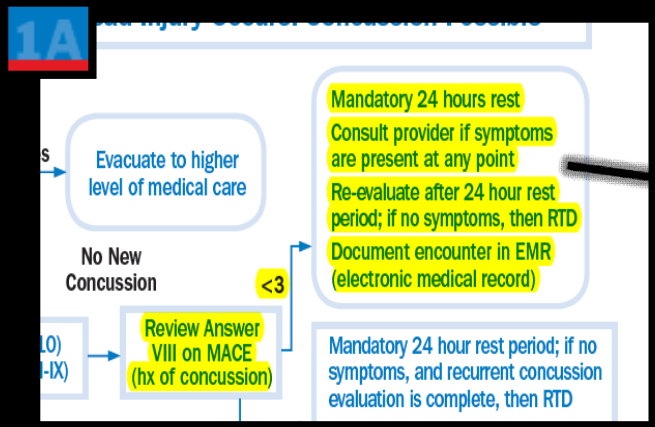
- In a non-concussed patient, **why screen for history of concussion**?
  - Some service members may have already sustained 3 concussions on their current deployment **prior to the policy change**
- Section Goal
  - Ensure recurrent concussions sustained during the deployment, but prior to the July 2010 policy change, are not missed

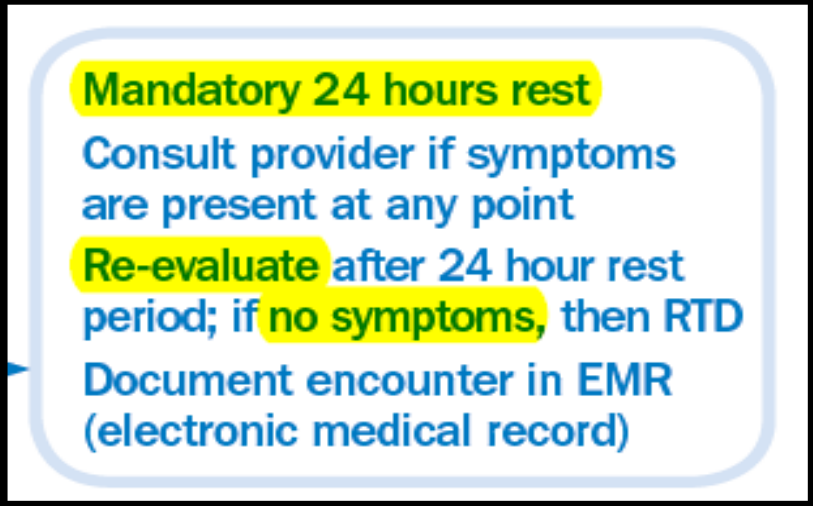


Slide 23

tbl4 cut the graphic: no new concussion + no symptoms = still review mace
tlattimore, 9/20/2010

Fewer than 3 concussions

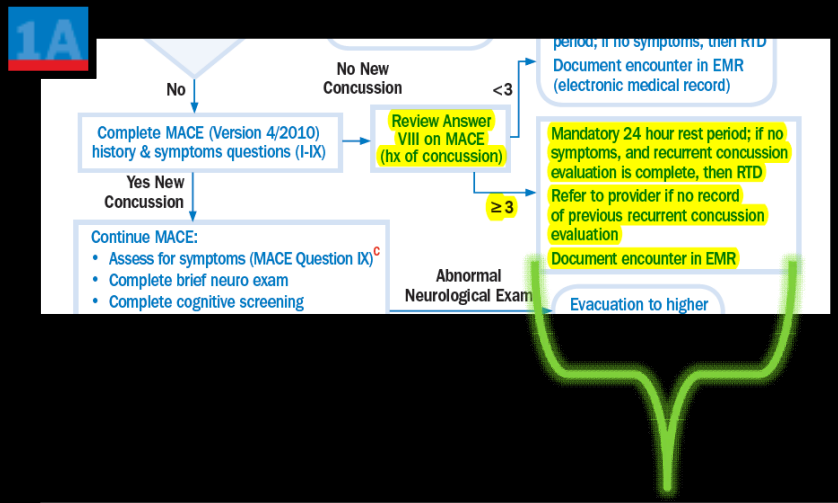


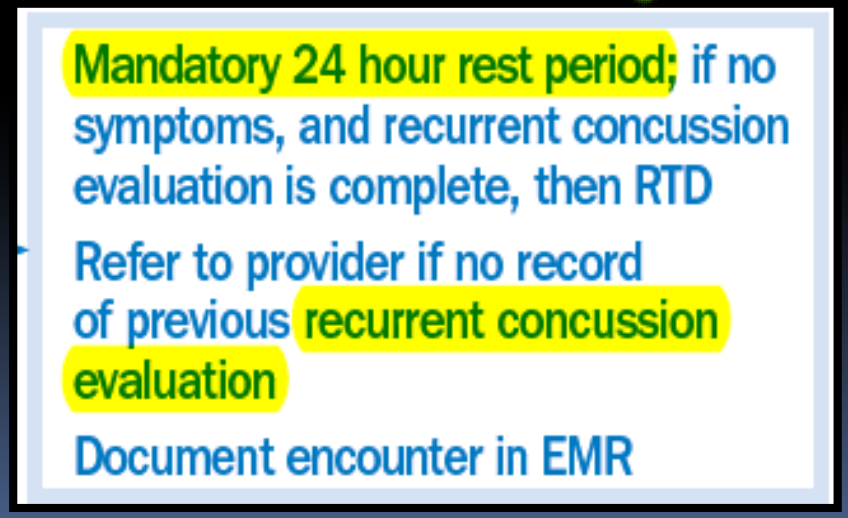


Every service member involved in a mandatory screening event who has had **fewer than 3** concussions in the past 12 months:

- MANDATORY REST for 24 hours
  - Remain inside the wire
- If symptom free at re-evaluation (after 24 hr rest) return to full duty
- 24hr clock starts at time of injury and not from time of evaluation
- Commanders can wave the mandatory rest but must provide documentation why it was necessary

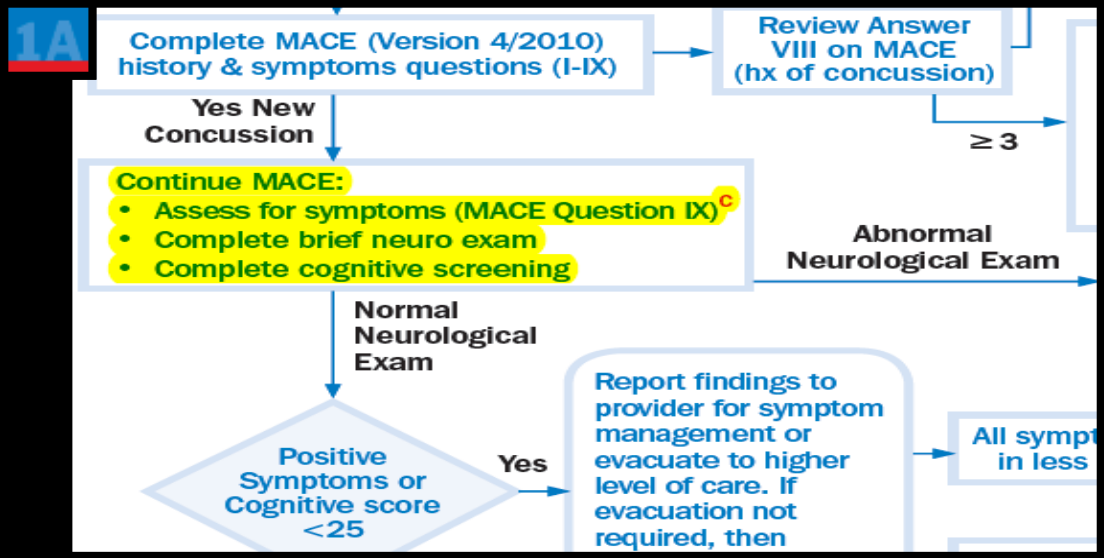
3 or More Concussions





- Every service member involved in a mandatory screening event who has a history of **≥ 3 concussions** receives:
  - REST for 24 hours
  - Recurrent Concussion Evaluation prior to RTD
    - Only done once per 3 concussions

Continuing the MACE



- New Concussion
  - Complete remaining sections of the MACE
    - Assess for symptoms (see "MACE question IX ," back of card)
    - Brief neuro screening
    - Cognitive screening

Assess for Symptoms

- Check for symptoms often seen in concussion
  - Document findings according to MACE scoring system:
    - **A** = No current symptoms
      or
    - **B** = One or more current symptoms

C Symptoms: **1B**

(Persisting beyond initial traumatic event)

1. Vertigo/Dizziness
2. Headache

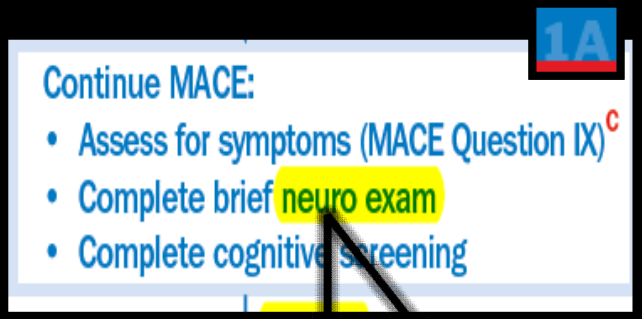
Military Acute Concussion Evaluation (MACE)

IX. Symptoms (circle all that apply)

1) Headache	6) Difficulty Concentrating
2) Dizziness	7) Irritability
3) Memory Problems	8) Visual Disturbances
4) Balance Problems	9) Ringing in the Ears
5) Nausea/Vomiting	10) Other_____

Symptom Score:
A (no current symptoms) / B (one or more current symptoms)

MACE Neurological Screening



- Check for neurologic deficits often seen in concussion
  - Document findings according to MACE scoring system:
    - **Green** = No current neurologic signs or
    - **Red** = One or more current neurologic signs
- If abnormal neurological screening:
  - **Evacuate to a higher level of care!**

XII. **Neurological Screening**
As the clinical condition permits, check
Eyes: pupillary response and tracking
Verbal: speech fluency and word finding
Motor: pronator drift, gait/coordination
Record any abnormalities.

Neurologic Screening Score:
GREEN (normal neuro exam) / RED (positive exam findings)

XII Neurological screening
Eyes; check pupil size and reactivity.
Verbal: notice speech fluency and word finding.
Motor: pronator drift- ask patient to lift arms with palms up, ask patient to then close their eyes, assess for either arm to "drift" down. Assess gait and coordination if possible. Document any abnormalities.

Military Acute Concussion Evaluation (MACE)

What Activities HELP the Brain Recover?

Cognitive (thinking)	physical
▪ Maximize downtime or rest during the day ▪ Adequate sleep at night	▪ Keeping the heart rate low ▫ Stay out of the heat ▫ Limited physical activity

Service members respond differently to physical and cognitive rest

- ➢ Some SMs may respond well to a desk job that includes no physical exertion with some cognitive exertion
- ➢ Other SMs will continue to worsen from the cognitive exertion
  - •Try further minimizing thinking intensive activities in this group

What Activities HURT Brain Rest and Recovery?

Cognitive (thinking)

- Mental exertion
  - Writing reports
  - Activities requiring intense concentration
- Inadequate sleep
  - Caffeine or "energy enhancers"
    - They prevent proper sleep at night
  - Irregular sleep schedule

Physical

- Exertion
  - Working
  - Heavy lifting
  - Exercising
- Physical activities that put you at risk for a second concussion
  - Sports
  - Combatives

Repeat evaluation is critical if symptoms are worsening or warning signs are experienced.

TBI Co-morbidities

- Physical: headaches, nausea, vomiting, dizziness, fatigue, blurred vision, sleep disturbance, sensitivity to light/noise, balance problems, transient neurological abnormalities
- Cognitive: attention, concentration, memory, speed of processing, judgment, executive control

TBI Co-morbidities

- Behavioral/emotional: depression, anxiety, agitation, irritability, impulsivity, aggression

CPG for Management of mTBI

- Natural Course of the Disease
  - Vast majority of pts. will improve in days to weeks with no lasting sequelae
  - Patients should be reassured and given expectations of a full recovery
  - Symptoms of Post Concussive Syndrome are not unique to mTBI and occur in healthy individuals as well as other conditions, such as PTSD, depression, & chronic pain

CPG for Management of mTBI

- Early Intervention
  - Early education of patients and families is the best available treatment for preventing / reducing the development of persistent symptoms. (Level A Evidence)
  - Primary care model is appropriate when implemented by an interdisciplinary team with specialized expertise.

[b] Red Flags:

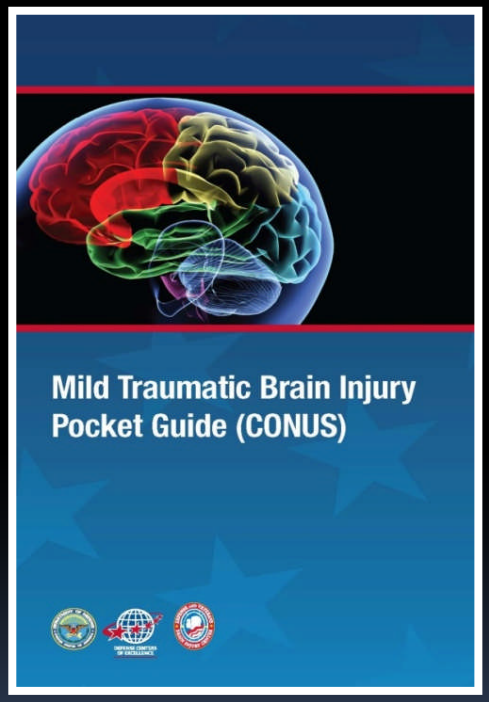
1. Progressively declining level of consciousness
2. Progressive declining neurological exam
3. Pupillary asymmetry
4. Seizures
5. Repeated vomiting
6. Double vision
7. Worsening headache
8. Cannot recognize people or disoriented to place
9. Behaves unusually or seems confused and irritable
10. Slurred speech
11. Unsteady on feet
12. Weakness or numbness in arms / legs

From DVBIC Updated Guidance May 8, 2008

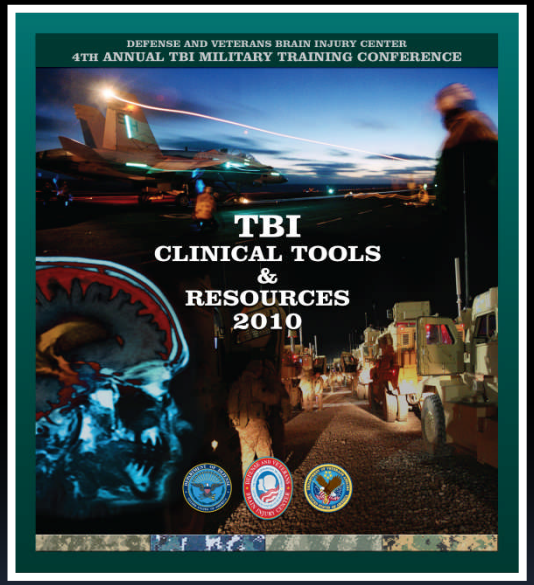
http://www.dvbic.org/images/pdfs/Clincal-Tools/E--Clinical-Guidance Evaluati

Products & Tools Available From DVBIC

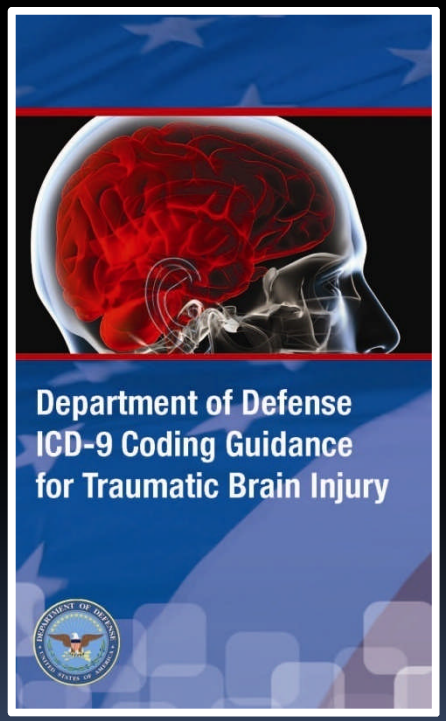
- ❑ mTBI Pocket Guide



- ❑ Clinician Resources & Tools Binder



- ❑ DoD ICD-9 Coding Guidance



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DoD TBI Module Summary

Proponency Office for Rehabilitation and Reintegration

Modules available on MHS Learn

Module	Audience
❑ TBI 101: TBI Foundation	All Audiences
❑ TBI 201: TBI Overview	Healthcare Providers
❑ TBI 301: First Responder Training	In-Theater Healthcare Personnel
❑ TBI 401: mTBI Symptom Management & Assessment Guidelines	Primary Care and TBI

TBI Modules in Development

TBI 100 Series

- ❑ TBI 101 Navy
- ❑ TBI 101 Marine Specific
- ❑ TBI 101 Air Force Specific
- ❑ TBI 101 v2: Army

TBI 200 Series

- ❑ TBI 202 Leader Training (In Development)
- ❑ TBI 203 NCAT Overview (Beta Stage)

TBI 300 Series

- ❑ TBI 301 v2 First Responder Training

TBI 400 Series

- ❑ **TBI 402 Care and Treatment for mTBI and Co-Occurring PH Conditions**
- ❑ **TBI 403 Pain Management and TBI**

TBI 500 Series

- ❑ **TBI 505a PT Care for mTBI**
- ❑ **TBI 505b PT Care for mTBI**

TBI 600 Series

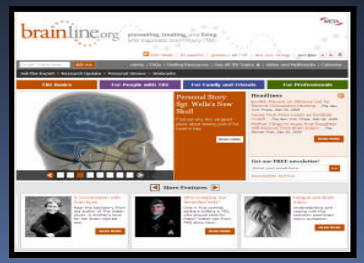
- ❑ **TBI 610 WRAMC WTU**

Web Based TBI Education & Resources

•www.dvbic.org

www.dcoe.health.mil

www.traumaticbraininjuryatoz.org



www.brainline.org

Rapid TBI Consultation

Providers, SMs & Families

- **DVBIC**
  - Info@DVBIC.org
- **DCoE 24/7 Outreach Center**
  - 1-866-966-1020
  - resources@dcoeoutreach.org
  - Live Chat
- **Military One Source**
  - 1-800-342-9647
  - wwrc@militaryonesource.com

Providers Only

- **TBI.consult @us.army.mil**
  - For Deployed Providers
  - Feedback Within 12 Hours
  - 38 TBI Specialists
  - 14 Clinical Disciplines
- **ANAM Baselines**
  - anam.baselines@amedd.army.mil

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Questions?

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